

CLAIMS

What is claimed is:

- 1 1. A method of performing file maintenance on a plurality of storage devices, comprising:
 - 2 (a) measuring file system parameters;
 - 3 (b) determining periods of low disk activity; and
 - 4 (c) upon determination of low disk activity period, performing a file maintenance action
 - 5 based on said system parameters;
 - 6 wherein (a), (b), and (c) are performed automatically.
- 1 2. The method of claim 1 wherein (a) includes maintaining a list of the files with the most I/O.
- 1 3. The method of claim 2 wherein (c) includes computing the average number of I/O cycles
2 on the storage devices and moving a file from one disk to another based on said average.
- 1 4. The method of claim 3 wherein said file is moved to the disk that results in the smallest
2 deviation from the average.
- 1 5. The method of claim 1 wherein (a) includes maintaining a list of the files with the most I/O
2 over a programmable period of time.
- 1 6. The method of claim 1 wherein (a) includes maintaining a fragmentation list of files that
2 have been fragmented.

1 7. The method of claim 6 wherein for each fragmented file in the fragmentation list, a value is
2 stored, said value being representative of the ratio of the size of the fragmented file to the number
3 of extents that are necessary to store the file on the storage devices.

1 8. The method of claim 7 wherein (c) includes selecting for defragmentation a fragmented file
2 that has a lower ratio than other fragmented files.

1 9. The method of claim 6 wherein (c) includes selecting a fragmented file to be defragmented
2 and storing said defragmented file on a different storage device than was used to store said
3 fragmented file.

1 10. The method of claim 6 wherein (c) includes selecting a fragmented file to be defragmented
2 and storing said defragmented file on the same storage device than was used to store said
3 fragmented file.

1 11. The method of claim 9 wherein (c) includes determining on which storage device to store
2 said defragmented file, said storage device determination including:

3 (c1) determining the amount of free space on each of said storage devices;

4 (c2) computing the average amount of free space on said storage devices; and

5 (c3) selecting the storage device on which to store said defragmented file that would result
6 in an amount of free space that is closer to the average computed in (c2) than would
7 be the case with other of said storage devices.

1 12. The method of claim 1 wherein (b) includes examining a queue of pending storage device
2 I/O requests to determine whether any I/O requests are pending.

1 13. A computer system, comprising:
2 a processor;
3 random access memory coupled to said processor;
4 a plurality of storage devices coupled to said processor;
5 software stored on said random access memory and executed by said processor, said
6 software performing maintenance on files stored on said storage devices in a
7 background mode.

8 14. The computer system of claim 13 wherein said software maintains a list of the files with
9 the most I/O in said random access memory.

10 15. The computer system of claim 14 wherein said software computes the average number of
11 I/O cycles for a predetermined set of files with the most I/O on the storage devices and moving a
12 file from one storage device to another based on said average.

1 16. The computer system of claim 15 wherein said software causes said file to be moved to the
2 disk that results in the smallest deviation from the average.

1 17. The computer system of claim 13 wherein said software maintains a list of the files with
2 the most I/O over a programmable period of time.

1 18. The computer system of claim 13 wherein said software maintains a fragmentation list of
2 files that have been fragmented.

1 19. The computer system of claim 18 wherein for each fragmented file in the fragmentation
2 list, said software stores a value, said value being representative of the ratio of the size of the
3 fragmented file to the number of extents that are necessary to store the file on the storage devices.

1 20. The computer system of claim 19 wherein said software selects for defragmentation a
2 fragmented file that has a lower ratio than other fragmented files.

1 21. The computer system of claim 18 wherein said software selects a fragmented file to be
2 defragmented and stores said defragmented file on a different storage device than was used to store
3 said fragmented file.

1 22. The computer system of claim 18 wherein said software selects a fragmented file to be
2 defragmented and stores said defragmented file on the same storage device than was used to store
3 said fragmented file.

1 23. The computer system of claim 21 wherein said software determines on which storage
2 device to store said defragmented file by:

3 determining the amount of free space on each of said storage devices;
4 computing the average amount of free space on said storage devices; and

5 selecting the storage device on which to store said defragmented file that would result in an
6 amount of free space that is closer to the average than would be the case with other
7 of said storage devices.

1 24. The computer system of claim 13 wherein said software examines a queue of pending
2 storage device I/O requests to determine whether any I/O requests are pending.

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